11/7/2003

- Objectives
- Indications
- Available Resources
- Guidelines

A Practical Application of Advanced Nutrition Support

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Survival Skills

Objectives

- Identify nutritional dilemmas
- Maximize available resources
- Provide optimal nutrition support with available resources

Indications for Advanced Nutrition Support

- Enteral
  - NPO 5-7 days
  - Inadequate oral intake
  - Dysphagia
  - Burns >35% TBSA
- Parenteral
  - Bowel Obstruction
  - Severe GI Bleed
  - High Output Fistula (>500mL/day)
  - Severe Pancreatitis
  - Intractable V/D
  - Acute IBD
  - Failure to tolerate TFs

NUTRITIONAL DILEMMAS

- "How" do I feed my patient?
- "When" should feeds begin?
- "How long" will the patient require additional nutrition support?
- "What" do I feed the patient?
- "How much" do I feed the patient?

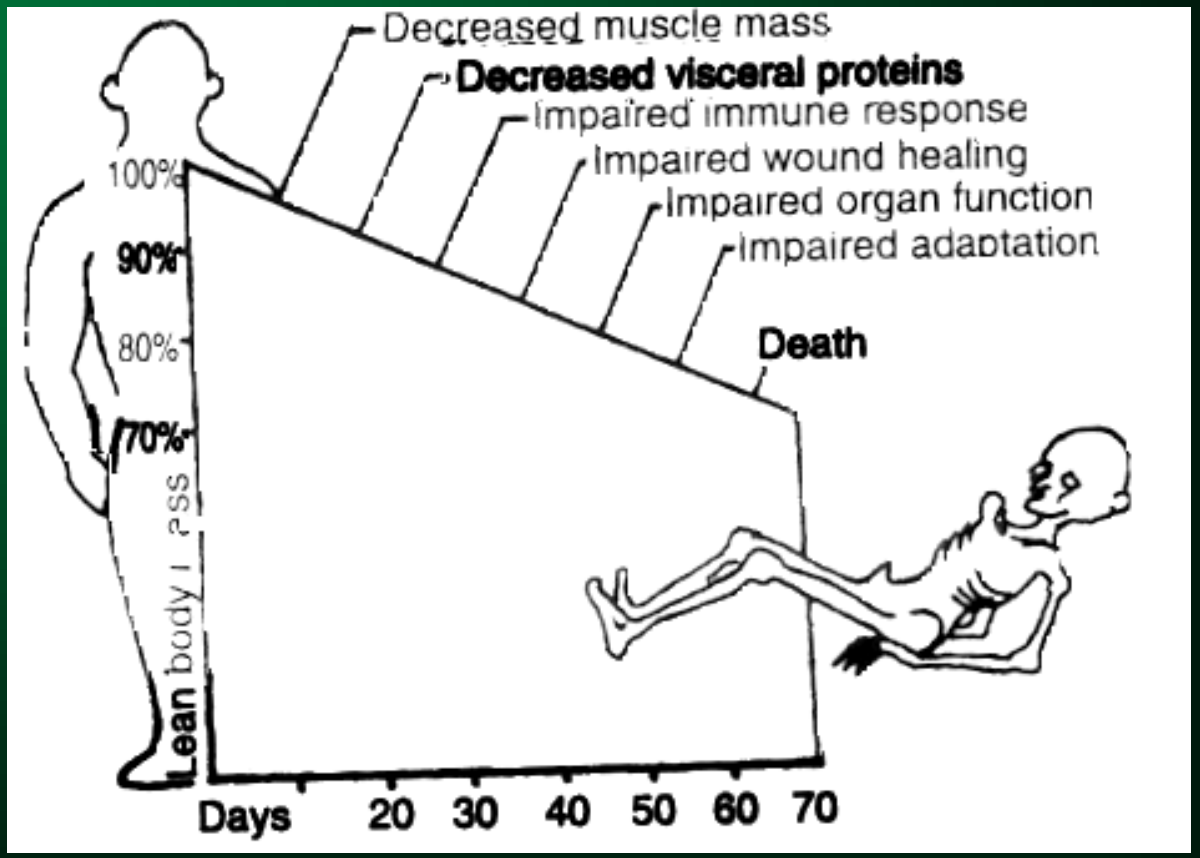
“How” do I feed my patient?

- Oral
- Tube Feeds
  - stomach vs. small bowel feeds
- Intravenous Solution
  - peripheral vs. central

“When” should I begin feeding?

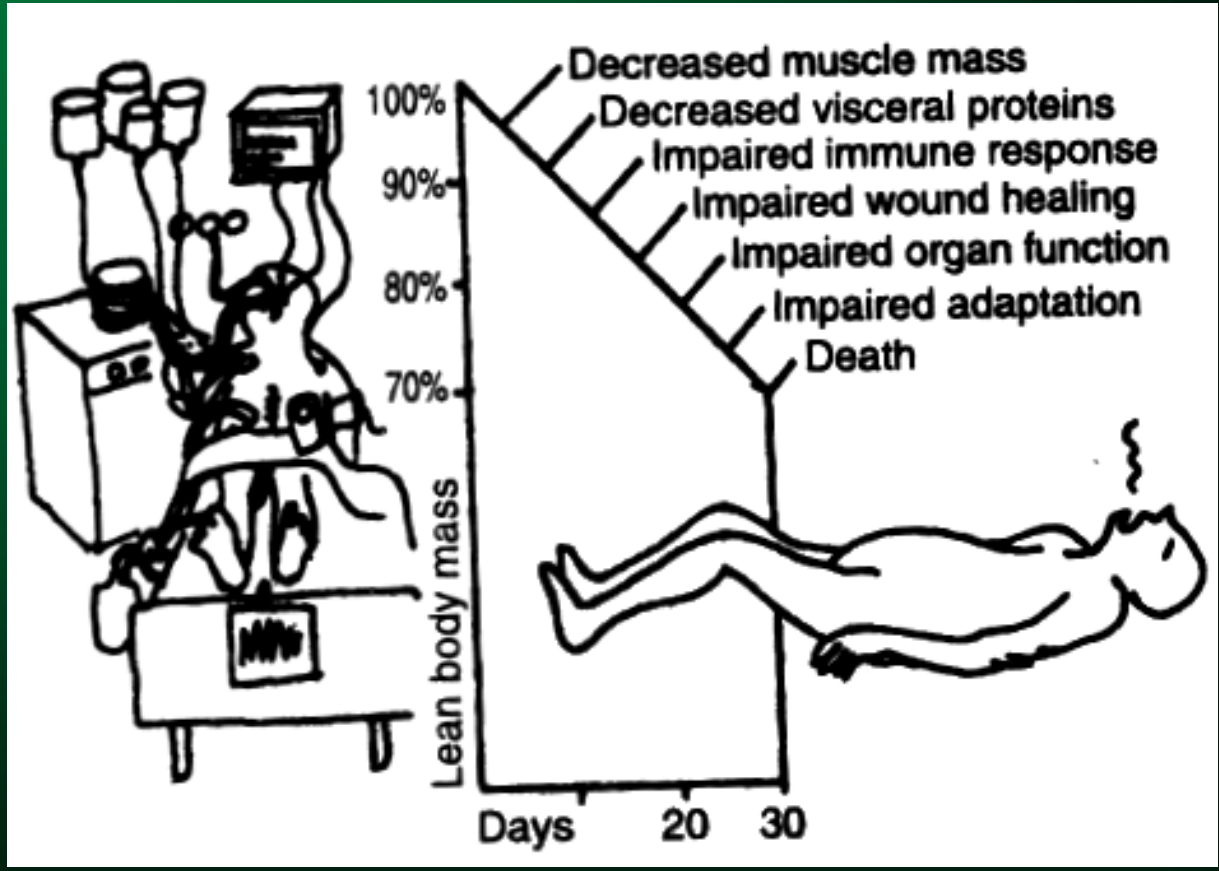
- As early as possible!!
  - Goal: prevent malnutrition
- Requirements:
  - Hemodynamic Stability (vital signs stable)
  - Access to Feed
  - Airway Protection

Natural Course of Simple Starvation without Stress (Hypometabolism)



Reference: Page CP, Hardin TC, and Melnik G. Nutritional Assessment and Support: A Primer (2nd Edition). 1994.

Natural Course of Starvation with Stress (Hypermetabolism)



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Metabolic Response

- Starvation (Marasmus)
  - Catabolic hormones at basal levels & anabolic hormones decreased
  - Decreased Energy Needs
  - Increases utilization of alternate fuel
  - Gradual wt loss
  - Transport proteins preserved
- Injury Stress
  - Catabolic hormones increased greater than anabolic hormones
  - Increased Energy Needs
  - Decreases utilization of alternate fuel
  - Rapid wt loss
  - Transport proteins reduced

“How long” will the patient require additional nutrition support?

- Short-term (<2 weeks)
- Long-term (>2 weeks)

“What” do I feed the patient?

- Specialized Products (commercial)
- Medical Army Rations
- Blenderized Diet
- Vitamin and Mineral Supplementation

“How much” do I feed the patient?”

- Perform Nutritional Assessment
  - medical problem, PmHx, age, sex, weight, height, diet hx (including allergies)
- References for Guidance
  - Field Manual No. 4-02.56
  - ADA & ASPEN Manuals
  - Medical Center MNT Handbook
  - Bowes and Church’s Food Values

Available Resources???

- Commercial Enteral Products
  - intact nutrients vs elemental
- Medical Diet Supplements
- Homemade Concoctions
- Commercial Parenteral Products
  - Dextrose, amino acids, lipids

Guidelines for Enteral Usage

- Determine best feeding route
- Estimate patient's Caloric and protein needs
- Calculate appropriate feeding regimen
- Monitor patient tolerance and appropriateness of nutrition support guidelines

Pediatric RDA Guidelines

- **Energy Needs**
  - Infant: 108-90Kcals/Kg
  - 1-3 y/o: 90-75Kcals/Kg
  - 4-10 y/o: 75-55 Kcals/Kg
  - 11-18 y/o: 55-40 Kcals/Kg
- **Protein Needs**
  - Infant: 3 - 1.6g/Kg
  - 1-3 y/o: 2.5 - 1.2g/Kg
  - 4-10 y/o: 2.5 - 1.2g/Kg
  - 11-18 y/o: 2.0 - 8.0g/Kg

Adult Feeding Guidelines

- Energy Needs
  - 20-25Kcals/Kg (obesity)
  - 25-30Kcals/Kg
  - 30-35Kcals/Kg (Trauma, Burns <20% TBSA)
  - ~40-60Kcals/Kg (Burns >20% TBSA)
- Protein Needs
  - 0.6-0.8g/Kg (protein intolerance)
  - 0.8-1.0g/Kg (maintenance)
  - 1.0-1.2g/Kg (mild stress, HD)
  - 1.2-1.5g/Kg (General ICU pt, wound healing, CAPD)
  - 1.5-2.5g (severe stress: Burns/Trauma/Sepsis/CAVH)

Guidelines for Commercial Enteral Product Usage

1. Identify Calorie and Protein content

2. Calculate volume of formula needed to meet estimated Calorie and protein needs

3. Determine % RDI and free water provided by calculated formula volume

Example with Osmolite

- Given est. needs: 2000-2400Kcals, 75-90g protein
- 1 can = 237mL/8 oz
  - 250Kcals per can or 1.06 Kcals/mL
  - 8.8grams protein per can or 14% total Calories
  - 199 mL free water
- 2000Kcals/ 250Kcals = 8 cans (min)
- 8 cans X 8.8gms protein= ~70gms protein
- 9 cans X 250Kcals = **2250Kcals**
- 9 cans X 8.8gms protein= **~79gms protein**

Example with Osmolite

- 1 can = 237mL/8 oz
  - 9 cans X 237 mL = **2133mL formula**
- 1 can contains 199 mL water
  - 9 X 199mL = **1791 mL free water from total volume**
- Per label 2000 Kcals provides 100% RDI
  - For wound healing and Burns consider additional supplementation: MVI, Vit C, Zinc

Administration of Formula

- Feeding volume= 1791 mL or 9 cans
- Continuous Recommendation
  - 1791mL/24 hours = ~75mL/hour
- Bolus Recommendation
  - general rule: 200-500mL per bolus
  - 1 can =237mL
  - 1 can q 2 1/2 hours or 2 cans q 5 hours
- Intermittent Recommendation
  - 150mL X 12 hours

Additional Water Needs

- To avoid dehydration and constipation
- Assess adequacy
  - urine color, I/O, chemistries, stool firmness
- Minimum Requirement:
  - 1mL free water/Kcal
  - Osmolite: 1791mL free water for 2250 Kcals
    --> need: 459mL addt'l water
- Conditions for higher needs
  - Burns/ Fever/GI losses

Medical Diet Supplements

- Carnation Instant Breakfast
  - Mix with milk for higher protein/ calories
  - 1 serving + 8 oz w. milk= 280Kcals, 12g protein
- Ensure
  - Follow directions for mixing powder
  - Provides:1.06Kcals/mL, 42g protein/L formula, 948mL formula=100% RDI, 845ml free water in 1L of formula

Blenderized Formula

- Food safety/sanitation is a must!
- Analyze nutrient content, then blenderize
- Use high biological protein source: milk/egg/ meat
- Fruit/veg/starch/oil source
- Thin solids (with milk, juice, broth, gravy or water) and strain, if needed

Tube feeding Guidelines

- Determine administration
  - Continuous, bolus, intermittent
- HOB >30 degrees
- Flush tube regularly with warm water (30-50mL) to avoid tube clogging
- Assess GI function for tolerance
- Transition to oral diet when possible

Assessing GI Tolerance

ASSESSMENT	APPROPRIATE	MALFUNCTION
BM	1-3 q 1-3 days	None >3 days, or >3/day or >500mL q 8hrs
BS	Present	Not present or high pitched
Abd Girth	Soft, usual diameter	Firm, distended
N/V	Not present	present
Fistula	Absent or low output	>500mL
Gastric Residual	Absent or low output	>200mL

Parenteral (Intravenous) Nutrition

- Partial or complete nutrition depending on gut function
- Simplest elements (dextrose, lipids, AA)
- Volume depends mainly on macronutrient concentration
- Determine macronutrient distribution
  - AA 15-20% total Calories
  - NP Calories use 30/70 or 40/60 split lipid/dex

PN Access determines feeding

- Peripheral Access (small veins)
  - Short- duration (<2 weeks)
  - High volume, low concentration
- Central Access (big veins)
  - Long-duration (>2 weeks)
  - Low volume, high concentration

Determining Volume of PN

- AA and dextrose noted in grams
- General guideline for concentration
  - Concentration = particle/solution
  - particle = macronutrient
  - Example
    - 10% solution--> .1g/mL
    - 70% solution--> .7g/mL

PN Concentration Guideline

- Calculate dextrose and AA concentration the same way
- Example 1:
  - 200g dextrose from 10% concentrated sol
  - 200g X 1mL/.1g= 2000mL
- Example 2:
  - 200g dextrose from 70% concentrated sol
  - 200g X 1mL/.7g= 286mL

Lipid Concentration in PN

- Noted as volume (mL) not weight (g)
- 20% concentration = 2Kcals/mL
- 10% concentration = 1.1Kcals/mL
- Lipids: concentrated Calories that do not bother vein patency

Rule of Thumb on concentration

- Larger veins (Subclavian) no limit on concentration
- Smaller veins require low concentrations
  - dextrose limits: not greater than 10% final concentration
  - amino acid limits: not greater than 3% final concentration

Caloric content

- 1 g Dextrose = 3.4 Kcals (hydrated)
- 1g AA = 4.0 Kcals
- 1 mL 20% lipid = 2Kcals
- 1 mL 10% lipid = 1.1Kcals

Assessing Nutritional Adequacy

- Are feeds at goal administration without interruption?
- Labs (visceral proteins, chemistries, urine)
- Physical Assessment
  - general appearance, vital signs, wt trends, fluid retention, skin, nails, hair, mouth, teeth, muscle strength

Case Questions?

- 1) Patient is allergic to milk products. What do you feed this patient?
- 2) Patient has intestinal obstruction. How do you feed this patient?
- 3) Pt has burns >35% TBSA. How do you feed this patient?
- 4) Pt is a 6 y/o underweight girl with burns from Iraq. What do you feed this patient?

Objectives

- Identify nutritional dilemmas
- Maximize available resources
- Provide optimal nutrition support with available resources

Questions???

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